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REPORT OF PINE-BEETLE SURVEYS
on the
MALHEUR NATIONAL FOREST
SEASON OF 1939

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon

SUBJECT--

INDEX No.--

REPORT OF PINE-BEETLE SURVEYS
on the
MALHEUR NATIONAL FOREST
SEASON OF 1939

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March 1940

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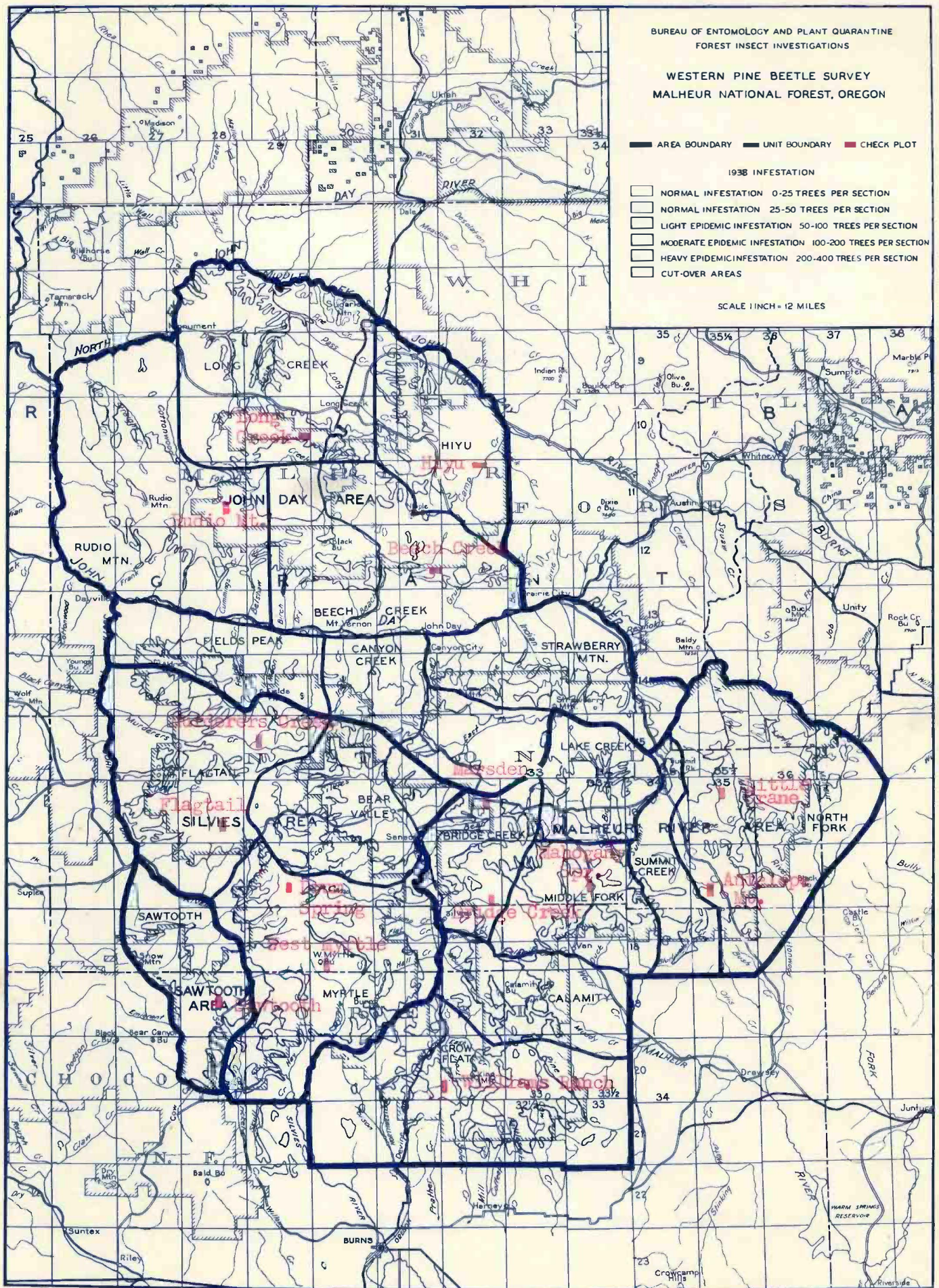
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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS

WESTERN PINE BEETLE SURVEY
MALHEUR NATIONAL FOREST, OREGON

- AREA BOUNDARY — UNIT BOUNDARY ■ CHECK PLOT
- 1938 INFESTATION
- NORMAL INFESTATION 0-25 TREES PER SECTION
 - NORMAL INFESTATION 25-50 TREES PER SECTION
 - LIGHT EPIDEMIC INFESTATION 50-100 TREES PER SECTION
 - MODERATE EPIDEMIC INFESTATION 100-200 TREES PER SECTION
 - HEAVY EPIDEMIC INFESTATION 200-400 TREES PER SECTION
 - CUT-OVER AREAS

SCALE 1 INCH = 12 MILES



Introduction.

To supplement general observations by forest officers on the Malheur National Forest, systematic surveys of the forest-insect situation, especially that of the western pine beetle (Dendroctonus brevicornis Lec.) in ponderosa pine stands on and adjacent to the forest were begun in 1931 and have been conducted annually since then. These surveys have been carried on cooperatively by the Forest Service and the Bureau of Entomology and Plant Quarantine. As in previous seasons, the 1939 survey was conducted by a field crew employed through the office of the Regional Forester and technically directed by the Portland forest insect laboratory.

Purpose of Survey.

The purpose of the survey is to obtain a comprehensive view of the current beetle situation in the pine stands of the forest, to ascertain the need for artificial control work, and to provide the basis for rating individual trees and forest areas according to their relative risk of beetle attack as an aid to timber management.

Methods Used.

The survey was both intensive and extensive in character. The intensive phase, carried on by a crew of three Field Assistants, consisted of recruising the 320-acre check plots for the current beetle losses, and in addition on some plots, the making of a 10-percent volume cruise of the green stand. By using the individual circular 1/4-acre random plot method, this volume cruising was carried on in conjunction with the regular spotting practice and required but slight additional time.

The extensive phase of the survey consisted of making a reconnaissance of all timber stands of the forest. By using the loss data obtained on the check plots as a guide, the writer made an ocular estimate on a per-section basis of the 1938 beetle losses in the pine stands. To make these estimates, observations were made from 19 primary or emergency lookouts, as well as from many other points of vantage and roads on the forest.

Period of Survey.

The survey began September 21 on the Williams Ranch Plot near the south boundary of the forest and was completed October 8 on the Radio Mountain Plot near the north side of the forest.

Survey Personnel.

The members of the survey crew consisted of Under Field Assistants P. A. Layman and J. P. Rhody and Junior Field Assistant R. C. Grant (Crew Leader). Grant had had two seasons' experience prior to starting on the field work. Rhody and Layman, with other inexperienced Under Field Assistants, were given 8 days of intensive instruction at a training school held at Camp Sisters on the Deschutes National Forest.

Intensive Acres Covered.

During the 19-day period September 21 to October 8, the crew covered fifteen 320-acre plots containing 4,718 timbered acres having a stand of 66,517,200 board feet of ponderosa pine. A 10 percent green stand volume cruise was made on 12 of these plots.

Location of check plots covered during 1939 is shown in figure 1, which also shows the area and unit boundaries. To eliminate the necessity of using the G.L.O. description each time when referring to a specific plot, each plot has been given a name, usually selected from some prominent physical character on or near the plot, and generally known to local forest officers. Table 1 gives these plot names, descriptions, and other pertinent plot data. These names will be used hereafter.

Extensive Acres Covered.

Although a reconnaissance was made of all timber stands of the forest, detailed estimates of insect losses were confined to ponderosa pine stands, that cover some 1,018,000 acres supporting 8,269,832 M board feet of this species. Figure 2 is a map prepared from these estimates showing the intensity and distribution of the 1938 infestation of the western pine beetle.

Past Losses.

The density of the ponderosa pine stands and few down logs or standing snags indicated that insect-caused losses had been negligible during the few decades previous to 1930. At the time the first plots were established in the fall of 1931, numerous recently killed trees indicated that the quiescent infestation of the western pine beetle had assumed an upward trend. Plot records then show the infestation continued upward, reaching its greatest intensity in 1932. Data of the Sawtooth Plot, Snow Mountain Area, show a 51.4 percent loss of stand for 1932 and 12.52 percent stand loss during the three years 1931-33. During this same period, losses amounted to 3.46 percent of stand for the entire forest.

The upward trend of infestation was largely due to the cumulative effects of drought conditions which became critical to tree growth at the beginning of this decade. This epidemic was checked by two periods of extreme subzero temperatures during the winter of 1932-33, when a low of -54° F. was recorded at Seneca, resulting in a mortality of 85.3 percent ¹ to overwintering broods of the western pine beetle. Improved growth conditions also aided in the decline of infestation which, except for a flareup in 1935, maintained a low level until 1937.

Recent Losses.

The 1939 survey of check plots completed the information on the total of 1938 losses and gave preliminary data on the trend of the 1939 loss. A summary of these data is given in table 2.

Less than 60 percent of the 1939 loss had developed at the time of the survey. The probable total loss was estimated by employing an estimating factor, based on experience, of the percent of loss generally found on date of cruise. Although subject to considerable error, it does give an indication of the probable 1939 loss trend.

A comparison of loss trends on check plots for the three-year period 1937-39 is given in table 3. While these data show considerable variation in trend of infestation on individual plots and between areas, the average infestation trend for the forest was upward through 1937 and 1938 with indications of a decline occurring during 1939.

Estimated Losses for 1938.

Estimated losses for the forest as a whole are given by units and areas in table 4, and summarized by areas in table 5. During 1938 the infestation trend was upward over the forest as a whole. Estimated losses were 23 percent above those of 1937. While the increase was greatest on poor sites at low elevations or on south exposures, pine stands on the better sites also suffered.

In the John Day Area centers of light epidemic infestation on the slopes near the west end of Fox Valley increased in size and intensity during 1938. A new center also developed on the Canyon Creek Unit of this area and probably will eliminate the scattered stands of mature ponderosa pine on the slopes of Canyon Creek proper. On the south slopes facing the John Day Valley the light epidemic assumed aggressive moderate epidemic proportions during 1938.

¹ Low Temperatures as a Limiting Factor in Western Pine Beetle Epidemics, 1933.—F. P. Kean, Entomologist, and J. A. Beal, Assistant Entomologist.

On the Silvies Area centers of moderate epidemic present in 1937 have increased in size and intensity, especially in the Flagtail Unit, where it assumed moderate epidemic proportions of aggressive nature. A new center of light epidemic was found to have developed on the Bear Valley Unit in the residual stands of the 40 percent cut, where a high percentage of beetle-susceptible trees has been left in the stands. Residual stands on the 80 percent cut have generally recovered from the effects of logging, and infestation there is at a very low stage. A more detailed report of the beetle situation in these cut-over stands is in the course of preparation by Mr. Stanley Noman, under the supervision of Mr. F. P. Keen of this office.

A large portion of the light epidemic present in 1937 on the Snow Mountain Area has increased to moderate epidemic proportions, which also extend to the south tip of the Silvies Area.

While there has been some increase of intensity of infestation on the Malheur River Area, there is little or no change in the boundaries of the infestation from those of 1937, when two small centers of moderate epidemic were found to exist in the Crow Flat and Calamity Units.

Other Insects.

Douglas Fir Tussock Moth (*Hemerocampa pseudotsugata* McD.)—Known to exist since 1937 ^{2/}, an infestation by this fir defoliator has been confined to Mudie Mountain Ridge, where it is isolated from other fir stands to the east by a strip of ponderosa pine and from other timber by open land to the northwest and south. The affected fir stands are not contiguous, but broken up into small areas, with the larger bodies found on the north slopes and in canyons.

During 1938, heavy defoliation occurred only in the more protected portion of the canyons involving perhaps two or three percent of the stand. During 1939, approximately 30 percent of the stand was severely defoliated. In certain areas intermingling reproduction and poles of western larch, ponderosa and lodgepole pines were also defoliated. About half the trees heavily defoliated during 1938 have died; the survivors were completely defoliated this season and undoubtedly will die. As the 1939 defoliation was much more severe than the previous seasons, a much higher percentage of the stand will be killed.

^{2/} Reported by Ranger Ward in 1937.

The writer visited the area on October 21, 1939, and made examinations of many widely separated points, but failed to find any live or dead adults, egg clusters hatched or unhatched, or small larvae. The lack of moth population indicates the infestation has definitely subsided. What caused such a tremendous population, as evidenced by the defoliation, to completely disappear is unknown. It will be of interest to examine the area next year to see if any active infestation remains in the previously affected areas, or has moved into previously unaffected stands.

Summary.

The 1939 pine-beetle survey was carried out during the period September 21 to October 8.

Survey data show that a general increase of western pine beetle infestation occurred over the forest during 1938. Preliminary data for 1939 indicate the infestation will probably decrease to some extent. Centers of moderate epidemic infestation were found to have developed during 1938 on the Radio Mountain, Beech Creek, Flagtail, Sawtooth, Myrtle, and Bear Valley Units, in addition to those existing on the Crow Flat and Calamity Units during 1937.

Tussock Moth.—Approximately 30 percent of the fir stands on Radio Mountain were severely defoliated during 1939, as compared with two or three percent defoliated during 1938. The absence of adults, eggs, or larvae at the time the area was visited on October 21 indicates, apparently, that the outbreak has ended.

Table 1.—Description of Check Plots on the Malheur National Forest.

Area and Units	Plot Name	Location			Elevation	Type	Site	Pine		Pine Volume as of Jan. 1, 1938	Board feet per Acre
		Sec.						Timbered	Acres		
		T.	R.	1/4							
<u>John Day</u>											
Long Creek	Long Creek	10	28	24S	4,650	20.5	4	320		2,971,170	9,810
Rudio Mtn.	Rudio Mtn.	11	28	26W	4,000	20.5	4	245		3,626,420	14,800
Hiyu	Hiyu	11	32	3S	3,800	20.5	4	320		2,544,190	7,930
Beech Creek	Beech Creek	12	31	25W	4,500	20.5	4	313		2,609,325	8,310
<u>Silvies</u>											
Flagtail	Murders Creek	15	29	17E	4,000	20.5	4	320		4,440,870	13,900
	Flagtail	16	28	26W	4,600	20.5	4	320		5,154,100	16,100
Myrtle	Drum Spring	17	29	26W	5,970	20.5	4+	320		4,701,210	14,700
	West Myrtle	18	30	32E	5,500	20.5	5	320		3,303,800	10,300
<u>Malheur River</u>											
Bridge Creek	Marsden	16	32	14E	5,100	20.5	4+	320		4,648,395	14,500
	Bridge Creek	17	32	36W	5,500	20.5	4	320		5,086,220	15,850
Middle Fork	Mahogany Spring	17	33 1/2	28E	4,000	20.5	4	320		3,830,840	11,950
North Fork	Little Crane Cr.	16	35	10W	5,500	20.5	4	320		8,561,340	26,750
Summit Creek	Antelope Mtn.	17	35	29E	5,500	20.5	4	320		4,464,190	13,900
Crow Flat	Williams Ranch	20	32	30W	6,100	20.5	5	320		5,491,635	17,100
<u>Snow Mtn.</u>											
Sawtooth	Sawtooth	19	28	15E	5,500	20.5	4	320		5,083,495	15,860
Totals for Forest		15 Plots						4,718		66,517,200	

Table 2.—Summary of Check Plot Data, Survey of 1939.

Areas and Plots	1938 Loss					1939 Loss				
	Total	Volume	Bd.ft.	% of	Trees	Total	Volume	Estimated	Percent of	
	Trees	Bd.ft.	per Acre	Stand	Marked	Trees	Bd.ft.	per Acre	Stand	
<u>John Day</u>										
Long Creek	35	32,020	100	1.07	1	7	5,370	17	.18	
Radio Mtn.	56	41,270	169	1.23	6	10	7,900	32	.22	
Hiyu	50	32,740	102	1.29	7	13	7,720	24	.31	
Beech Creek	87	35,775	116	1.35	59	108	66,400	212	2.59	
Area Total	228	141,805	118	1.21	73	138	87,390	73	.74	
<u>Silvies</u>										
Murderers Creek	75	56,570	177	1.27	32	64	54,000	168	1.22	
Flagtail	46	43,965	137	.85	8	15	15,750	49	.31	
Drum Spring	22	24,910	78	.53	3	15	10,300	32	.22	
West Myrtle	12	17,570	55	.53	3	6	5,500	17	.17	
Area Total	155	143,015	112	.81	46	100	80,600	63	.46	
<u>Malheur River</u>										
Marsden	46	25,945	81	.51	43	97	61,900	193	1.33	
Bridge Creek	38	35,470	112	.70	11	26	22,000	69	.68	
Mahogany Spring	29	22,040	69	.58	14	32	25,200	78	.43	
Little Crane Cr.	15	29,040	90	.34	6	13	17,650	55	.46	
Antelope Mtn.	10	8,890	28	.20	2	4	4,840	15	.09	
Williams Ranch	62	29,235	91	.54	44	104	54,150	170	.99	
Area Total	200	150,620	78	.47	120	276	185,740	97	.58	
<u>Snow Mtn.</u>										
Sawtooth	35	24,195	76	.47	47	105	54,200	170	1.07	
Totals for Forest	618	459,635	98	.69	286	619	407,930	87	.61	

Table 3.--Infestation Trends on Check Plots for 3-Year Period 1937-39.

Areas and Plots	1937		1938		1939 (Estimated)	
	Bd. ft. per Acre	Ratio 1937 to 1936	Bd. ft. per Acre	Ratio 1938 to 1937	Bd. ft. per Acre	Ratio 1939 to 1938
<u>John Day</u>						
Long Creek	35	1.05	100	2.85	17	.17
Rudio Mtn.	136	-	168	1.24	32	.19
Hiyu	52	-	102	1.96	24	.23
Beech Creek	112	.64	116	1.01	212	1.90
Ave. for Area	80	.71	118	1.48	73	.62
<u>Silvies</u>						
Murderers Creek	140	1.57	177	1.26	168	.95
Flagtail	89	-	137	1.54	49	.36
Drum Spring	67	1.28	78	1.16	32	.41
West Myrtle	44	2.40	55	1.25	17	.31
Ave. for Area	85	1.53	112	1.31	67	.60
<u>Walheur River</u>						
Marsden	77	1.68	81	1.04	193	2.38
Bridge Creek	105	1.50	112	1.05	69	.62
Mahogany Spring	136	1.56	69	.50	78	1.13
Little Crane Creek	52	-	90	1.72	55	.61
Antelope Mtn.	14	-	28	2.10	15	.54
Williams Ranch	129	-	91	.71	170	1.87
Ave. for Area	86	1.56	78	.91	97	1.24
<u>Snow Mtn.</u>						
Sawtooth	100	.92	76	.75	170	2.25
<u>Average for all plots</u>						
		1.16		1.13		.90

Table 4.—Estimated Ponderosa Pine Losses for 1938 on the Malheur National Forest.

Area and Units	Ponderosa Pine		Volume of Pine 1938, Mbm.	Estimated 1938 Loss			
	Acreage			Trees	Volume Mbm.	Bd. ft. per Acre	% of Stand
	Total	Virgin					
<u>John Day</u>							
Long Creek	40,680	37,440	203,619	2,340	2,250	55	1.10
Radio Mtn.	81,686	81,686	545,105	8,900	7,010	87	1.30
Hiju	19,460	11,900	511,806	3,050	1,850	94	.36
Beech Creek	88,680	86,440	655,853	9,600	5,960	67	.91
Fields Peak	25,760	25,760	60,346	1,490	940	37	1.55
Canyon Creek	62,880	58,880	309,634	7,600	4,940	78	1.60
Strawberry Mtn.	41,860	38,260	163,780	1,670	1,050	25	.64
Area Total	361,000	340,360	2,450,143	35,250	24,000	67	.98
<u>Silvies</u>							
Flagtail	96,784	96,784	650,394	9,400	8,800	91	1.35
Bear Valley	78,513	16,900	589,968	6,550	3,300	42	.56
Myrtle	114,703	114,703	935,141	9,800	7,900	69	.85
Area Total	290,000	228,387	2,175,503	25,750	20,000	69	.92
<u>Malheur River</u>							
Lake Creek	31,500	31,500	318,717	350	350	11	.11
Summit Creek	32,140	32,140	459,857	590	590	18	.13
North Fork	73,880	73,880	944,139	1,500	1,500	21	.16
Bridge Creek	44,356	40,756	500,000	4,170	3,110	70	.61
Middle Fork	44,940	42,700	478,259	3,680	2,900	65	.61
Calamity	25,992	25,992	187,581	3,400	2,260	37	1.21
Crow Flat	61,192	48,162	431,067	6,300	3,290	54	.76
Area Total	314,000	295,130	3,319,620	19,990	14,000	45	.42
<u>Snow Mtn.</u>							
Sawtooth	53,000	53,000	324,566	5,100	2,600	49	.80

Table 5.—Summary of Estimated Ponderosa Pine Losses by Areas for Season 1938.

Area	Ponderosa Pine		Volume of Pine 1938, MbM.	Estimated Pine Losses			
	Acreage			Trees Killed	Volume MbM.	Bd. ft. per Acre	% of Stand Killed
	Total	Virgin					
John Day	361,000	340,360	2,450,143	35,250	24,000	67	.98
Silvies	290,000	228,387	2,175,503	25,750	20,000	69	.92
Malheur River	314,000	295,130	3,319,620	19,990	14,000	45	.42
Snow Mountain	53,000	53,000	324,566	5,100	2,600	49	.80
Totals for Forest	1,018,000	869,177	8,269,832	68,090	60,600	59	.73

FIG. 2.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS

WESTERN PINE BEETLE SURVEY
MALHEUR NATIONAL FOREST, OREGON

— AREA BOUNDARY — UNIT BOUNDARY □ CHECK PLOT

1938 INFESTATION

- NORMAL INFESTATION 0-25 TREES PER SECTION
- NORMAL INFESTATION 25-50 TREES PER SECTION
- LIGHT EPIDEMIC INFESTATION 50-100 TREES PER SECTION
- MODERATE EPIDEMIC INFESTATION 100-200 TREES PER SECTION
- HEAVY EPIDEMIC INFESTATION 200-400 TREES PER SECTION
- CUT-OVER AREAS

SCALE 1 INCH = 12 MILES

